



# Banco do Brasil's Commitment to Climate Change

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## Context

Climate change is currently one of humanity's greatest challenges. The emission of greenhouse gases (GHG) caused by human activities and their possible impacts on economic and ecological processes, based on strong scientific evidence, has presented a disruptive potential of economic and social processes that needs to be addressed by society.



In 2015, during the United Nations Framework Convention on Climate Change in France, 196 countries signed the Paris Agreement, a document through which they committed themselves to adopt targets for reducing greenhouse gas emissions, aiming to reduce emissions from their production processes, in an attempt to combine efforts for the benefit of a low carbon future, in which global average warming does not exceed 2°C above the pre-industrial, economic and social levels that need to be addressed by society.

To achieve the ultimate goal of the Agreement, governments have engaged in building their own commitments, based on the so-called Nationally Determined Contributions (NDC). Through the NDCs, each nation presented its contribution to reducing greenhouse gas emissions, following what each government considered feasible from the local social and economic scenario. The Brazilian government has committed itself to reduce greenhouse gas emissions by the year 2025 by 37% below 2005 levels, with a subsequent indicative contribution of reducing greenhouse gas emissions by 43% below 2005 levels by 2030.

For leaders of the World Economic Forum (WEF), environmental risks are among the most serious in terms of their effect on the world's wealth and prosperity today. Climate change has been high on the forum's agenda for the past five years, with the recognition that it is reaching a crisis point in many parts of the world. According to the "Global Risks Report 2019"<sup>1</sup>, since 2011 climate change has been among the top five global risks in terms of probability and economic impact.

In 2018, the *Intergovernmental Panel on Climate Change* (IPCC) launched a special report, in which it reinforces that, even with the goals established by the countries under the Paris Agreement, the trajectory toward an average temperature increase of 3°C by the end of the century in relation to the pre-industrial levels (IPCC, 2018), considering the observed trends and the impacts on economic activities.

1. Available at [http://www3.weforum.org/docs/WEF\\_Global\\_Risks\\_Report\\_2019.pdf](http://www3.weforum.org/docs/WEF_Global_Risks_Report_2019.pdf)

## TCFD – Task Force on Climate-Related Financial Disclosure

The Financial Stability Board (FSB) was set up in 2009 by the Group of 20 (G20)<sup>2</sup>, a group of economic ministers and central bank presidents from the 19 most developed countries in the world, plus the European Union. The FSB is the international body that monitors and makes recommendations on the global financial system. In 2015 it announced the establishment of a task force, the Task Force on Climate-related Financial Disclosures (TCFD), to develop a consistent way of reporting financial risks related to climate change.

As such, companies will have to develop a governance model for the climate change theme containing strategy, risk and opportunity management and management indicators, aiming to provide information on the potential impact of climate change to clients, investors, insurers and other stakeholders in relation to the impacts of physical risks, transition risks and other opportunities related to the issue.

According to the TCFD report<sup>3</sup>, one of the most significant risks facing organizations today is related to climate change. While it is widely recognized that the continuity of greenhouse gas emissions is aggravating global warming and this may lead to economic and social losses, the exact timing and severity of physical effects are difficult to estimate, which makes the problem a unique challenge, especially in the context of economic decision-making.

Impacts are not only physical and do not manifest themselves only in the long-term. The reduction of GHG emissions implies a reduction in the use of fossil fuels and related physical assets, with the consequent loss of profitability of related activities. On the other hand, the transition to a low-carbon economy generates opportunities for solutions in mitigating emissions and adapting to the consequences of climate change, such as increasing clean and more efficient technologies, targets for

reducing resource consumption (energy, fuels, paper), financing low-carbon farming techniques, prioritization of photovoltaic and wind energy sources, increasing the resilience of city infrastructure etc.

The expected transition to a low-carbon economy is estimated to require about USD 1 trillion of investment per year, generating new investment opportunities. At the same time, the

reputational risk of organizations exposed to the effects of climate change can vary significantly, as these organizations may be most affected by the physical impacts of climate change, by climate policies and by new technologies. A 2015 study<sup>4</sup> estimated that by the end of the century the value of assets in the world at risk from climate change will range from USD 4.2 trillion to USD 43 trillion.

Banco do Brasil, aware of the relevance and urgency of the issue of climate change and the importance of engaging governments, the private sector and society in efforts to reduce greenhouse gases and to adapt communities in areas of climate vulnerability, is committed to the transition to a low-carbon economy and to the leadership role that Brazil can assume in this issue.



2. The Financial Stability Board (FSB) was established in 2009 as the successor to the Financial Stability Forum (FSF). The FSF was founded by the G7 in 1999 and by a demand from G20 leaders in 2008 to become a stronger institution, it was re-established as FSB in 2009.

3. *Recommendations of the Task Force on Climate-related Financial Disclosures*. Available at <https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Report-062-817.pdf>

4. The Economist Intelligence Unit, "The Cost of Inaction: Recognizing the Value at Risk from Climate Change", 2015. Value at risk measures the loss a portfolio may experience, within a given time horizon, at a particular probability, and the stock of manageable assets is defined as the total stock of assets held by non-bank financial institutions. Bank assets were excluded as they are largely managed by banks themselves.

## What guides us?

At Banco do Brasil, Corporate Socio-environmental Responsibility (CSR) is expressed in policies and in the various voluntary commitments assumed over time. The main objective of governance in CSR is to manage BB's socio-environmental performance, which occurs based on the implementation and dissemination of the Socio-environmental Responsibility Policy (PRSA), which considers, in an integrated manner, the economic, social and environmental dimensions in business and in the ethical and transparent relationship with stakeholders.

Climate change is included in the Socio-environmental Responsibility Policy - PRSA and also in the BB Sustainability Guidelines for Credit.

The Guidelines provide socio-environmental guidance to be considered in the analysis of loan and financing proposals. They address strategic issues, including climate change, and are applicable in the analysis and granting of credit to the sectors of Agribusiness, Electrical Energy, Civil Construction, Mining, Oil and Gas, Transportation, Irrigated Agriculture, Steel and Pulp and Paper. The preparation and annual review of the Guidelines involves a range of stakeholders (shareholders, industry experts, NGOs, customers and employees), supported by the analysis of studies and reports that, in turn, consider projections of global climate models. In 2018, the Guidelines were updated considering the legal, political, economic and socio-environmental aspects.

Other policies include various socio-environmental aspects, which are also considered in business and administrative practices, such as credit and investment operations, and relationships with suppliers and employees. Due to their relevance, these guidelines are replicated in the Credit Sustainability Guidelines for different sectors.



## Agenda 30 BB

**is a tool for us to monitor initiatives instituted according to the Socio-environmental Responsibility Policy**

### Sustainability Plan - Agenda 30 BB

Banco do Brasil's Sustainability Plan contributes to the improvement of business and processes by consolidating actions with a social and environmental focus. Revised every two years and ordered into sustainability challenges prioritized by senior management, it is broken down into commitments established for a period of three years.

Since 2017, the Plan has been called Agenda 30 BB. The new agenda reflects the premises of the global 2030 Agenda and is inspired by the Sustainable Development Goals (SDGs), responding to the global call to build a world driven by adequate management of natural resources, respect for human rights and generation of sustainable results.

# SUSTAINABLE DEVELOPMENT GOALS



The Agenda 30 BB ensures that internal processes are adopted in a robust manner, agreeing on commitments and actions that have an impact on the business as a whole. With increasingly sustainable business and administrative practices, BB disseminates to its entire value chain the importance of incorporating the principles of sustainability in the planning and execution of actions. Sustainability is a transversal pillar in the Bank's strategy, whose leaders are committed to the challenge of reconciling business competitiveness with the construction of a more sustainable world.

In the Sustainability Plan - Agenda 30 BB 2019-2021, climate issues are included in **challenges 17** (to improve the

management of the climate change theme at Banco do Brasil so as to include governance, risks, opportunities and adaptations) and **19** (to improve the management of social and environmental risk based on socio-environmental criteria in the granting of financing, also considering controversial issues). BB's Annual Report provides an account of the actions taken in the previous period and the actions that will be taken in the coming years.

### Voluntary pacts and commitments

For almost three decades, Banco do Brasil has participated in various Forums and Initiatives in the governmental and private spheres.





Among the voluntary commitments and pacts made over time, several address the issue of climate change directly or transversely, such as the following:

- *Caring for Climate - The Global Compact*
- *CDP*
- *Companies for the Climate - EPC Platform*
- *Sustainable Development Goals - SDG*
- *Equator Principles*
- *Brazilian GHG Protocol Program*

### **Governance in CSR**

CSR governance permeates the organizational structure and is expressed in the policies and various voluntary commitments assumed. The main objective of governance in CSR is to manage social and environmental performance, based on the Socio-environmental Responsibility Policy (PRSA), which takes into account, in an integrated manner, the economic, social and environmental dimensions in business and the ethical and transparent relationship with stakeholders.

Issues related to climate change, both from the perspective of risks and opportunities, are dealt with, according to their specificities, by the various instances that are part of governance in CSR at BB.

Strategically, the CSR issue is conducted by the Strategy and Organization Directorship (Direo), while the Risk Management Directorship (Diris) is responsible for climate risk management.

The Sustainability Forum, which is subordinate to the Executive Business Committee, monitors quarterly the social and environmental initiatives and actions set forth in the Agenda 30 BB and supports the process of incorporation, alignment and dissemination of the precepts and practices of mitigation and adaptation to climate change. The Board of Directors, in turn, approves the actions proposed in the BB Sustainability Plan (Agenda 30) every two years, in addition to seeking to improve the institution's performance in relation to climate issues.

BB's socio-environmental performance is also monitored annually by BB's Management Committee, assisted by the Risk and Capital Committee, whose purpose is to assist the Board of Directors (CA) in the exercise of its functions related to risk management, including climate risk.

The governance of CSR at BB is structured as follows:

- **Board of Directors:** annually monitors social and environmental performance and ongoing initiatives;
- **Board of Officers:** approves the actions of the Sustainability Plan - Agenda 30 BB every two years and monitors the related initiatives every six months;

- **Risk and Capital Committee:** advises the Board of Directors in the exercise of its functions related to risk management, including socio-environmental and capital management;
- **Sustainability Forum:** supports the incorporation, alignment and dissemination of sustainability precepts and practices, and monitors social and environmental initiatives

and the implementation of the actions of Agenda 30 BB. This forum is quarterly and reports to the Executive Business Committee;

- **Strategy and Organization Directorship:** conducts the corporate social and environmental responsibility issue;
- **Risk Management Directorship:** conducts social and environmental risk management at Banco do Brasil.



## *Climate risk management*

By definition, climate risk is the possibility of losses arising from the transition of businesses to a low-carbon economy, the triggering of extreme climate events or that will have long-term consequences and may affect the generation of value by companies. This new approach was based on the recommendations published by TCFD, in which financial institutions were asked to identify and transparently disclose climate change risk, and to suggest analysis of climate elements as key elements for the resilience of the business strategy.



By November 2018, the management of risks arising from climate change was carried out at BB within the scope of social and environmental risk. Due to the possibility of losses resulting from the triggering of extreme weather events and the transition of businesses to a low carbon economy, which may affect the generation of value by companies, climate risk is now considered even more relevant in strategic decisions, since it is an element that will influence the future profitability of the Bank's business.

The effects of climate change can influence various market segments. Thus, it seeks to know and measure the impact of physical and transition risks on financing and insurance portfolios. Physical risks related to extreme weather events,

such as floods and windstorms, are considered in the evaluations because they are directly related to the increase in operating costs and the reduction of business revenues.

In the processes of granting and conducting loans and financing, the management of climate risk is particularly important, as Banco do Brasil is the largest financier of Brazilian agribusiness, with a 60% market share. Thus, climate risks have significant impacts on the rural activity financed by BB, due to its vulnerability to increasingly recurrent and intense extreme climate events.

As a way to minimize these risks, we observe the recommendations of the Agricultural Zoning of Climate Risk (Zarc) of the Ministry of Agriculture, Livestock and Supply, revised annually, which indicate the municipalities with climatic and soil suitability for certain crops and which are the most adapted cultivars. Furthermore, BB customers also have a portfolio of products at their disposal that includes Agricultural Insurance, Agricultural Revenue Insurance, Proagro and Proagro Mais.

The registration of climate events is carried out through the Climate Risk Monitoring System which covers the entire national territory based on alerts of climate events issued by the network of agribusiness advisers that are registered in the Crop Monitoring Panel and allow observing the recurrence of extreme events and changes in the local climate pattern and adopting preventive measures to mitigate crop losses.



## ***Business opportunities***

On the opportunities arising from climate change, the Bank supports initiatives aimed at mitigation, such as the Low Carbon Agriculture Program (ABC Program), which represents an opportunity for both BB and for rural producers.

The ABC Program has the potential to contribute to the achievement of the environmental goals of the Paris Agreement (NDCs). Its role is especially relevant, as Brazil has presented targets that are not conditional on the receipt of international resources, which further justifies the need for its strengthening and alignment with the objectives of mitigating greenhouse gas emissions (GHG).

Since its launch in 2010, BB has been leading the initiative, which finances sustainable agricultural production systems, with recognized capacity to reduce or sequester greenhouse gas (GHG) emissions and promote the production of vegetation/biomass and food, as well as the preservation of the environment.

Initiatives aimed at reducing CO<sub>2</sub> emissions in the agricultural activity supported by the ABC Program resulted in contracting operations in 2018 in the amount of BRL 1.7 billion at a contracting cost of BRL 6 million. Customers also have a portfolio of products at their disposal that includes Agricultural Insurance, Agricultural Revenue Insurance, Proagro and Proagro Mais. In the 2017-2018 crop year (period from July 1, 2017 to June 30, 2018), 64.7% of all agricultural funding, in the amount of R\$ 31.2 billion, was

covered by Agricultural Insurance and Proagro to mitigate the risk of production loss due to extreme weather events.

Additionally, with national prominence in the development of financial solutions and business models that promote the transition to a Green and Inclusive Economy, we consider climate change in planning and take advantage of business opportunities for a low-carbon economy, especially to meet the needs for reducing emissions assumed by Brazil at the Paris Conference.

Based on a methodology developed by the Brazilian Federation of Banks (Febraban), which deals with the measurement and identification of resources allocated to sectors of the Green Economy, in 2018 BB's green business portfolio presented a balance of BRL 189.6 billion. This includes credit operations related to investments and loans for renewable energy, energy efficiency, sustainable construction, sustainable transport, sustainable tourism, water, fishing, forestry, sustainable agriculture and waste management sectors.

In 2016, BB joined the CDP Supply Chain Program and, in 2017, it started to rely on quantitative and qualitative data regarding the risks and opportunities of climate change, GHG and water resources management of the value chain of suppliers to define strategies for working with this public.



Find out more at <https://ri.bb.com.br/en/corporate-governance-and-sustainability/sustainability/>

### BB Environmental Management System

The internal management of the effects of climate change is aligned with the Sustainability Plan - Agenda 30 BB, in relation to the development of initiatives and adoption of practices that contribute to the mitigation of the effects of operations on social and environmental aspects.

The BB Environmental Management System - EMS is in accordance with environmental legislation, with reference to the Brazilian Standard ABNT NBR ISO 14.001. The System consists of a set of objectives, premises, requirements, responsibilities, programs, initiatives and standards for the implementation of environmental guidelines, aligned with BB's Specific Policy on Socio-Environmental Responsibility.

It is the premise of BB's EMS to consider the external and internal context of the organization in the search for continuous improvement of its System. BB's EMS carries out communication actions to stimulate the efficient consumption of natural resources and prevent pollution, by raising awareness, engagement and strengthening of culture in RSA. In addition, BB continuously seeks to improve its environmental management skills, through training aimed at developing an environmentally appropriate conduct inside and outside the professional environment.

BB's EMS is composed of Environmental Programs, Initiatives and Indicators, including:

- Energy Conservation Program - Procen
- Rational Water Use Program - Puragua
- Toner Cartridge Reconditioning Program - Prorec
- Selective Collection Program
- PGRS - Solid Waste Management Plan
- Sustainable Procurement and Contracting
- Paper Consumption Reduction Project
- Disposal of Unserviceable Movable Property
- ISO 14.001 Certification
- Indicator: Operational Efficiency Index - IEO

The following are some initiatives that contribute to the reduction of GHG emissions.

### ➤ **Consumption of energy from renewable sources**

Banco do Brasil and EDP, one of the largest private companies in the electricity sector in the world, signed a partnership in 2018 for the Bank to enter the free energy market. The contract will provide around 400 GWh to 24 BB branches located in 14 states, on a five-year contract. To get an idea of the contracted volume, the energy purchased is equivalent to the annual consumption of a city with 130,000 inhabitants.

With entry into the free contracting environment (ACL), BB estimates a reduction of around BRL 50 million in electricity compared to the expenditure made in the so-called regulated contracting environment (ACR), which are the distribution companies that supply the National Integrated System (SIN).

The great benefit of the partnership is that the energy purchased will be of the subsidized type, originating from generators of renewable sources, such as wind, solar and small hydroelectric power plants (PCHs), which reaffirms the Bank's commitment to adopting actions that involve the reduction of GHG emissions in its operations.

At the same time, BB opened an invitation to tender for the contracting of a company, in the modality of distributed generation, which will provide electrical energy obtained by the direct conversion of sunlight into electricity through a photovoltaic source. By 2020, the Bank intends to supply 58 branches in the state of Minas Gerais with this energy, which corresponds to one-sixth of electricity consumption in that state.

In 2018, initiatives to reduce electricity consumption, which included internal awareness actions, replacement of fluorescent lamps with LED lamps and the modernization of air conditioners, helped to avoid expenses of BRL 8 million. In relation to electricity consumption, there was a reduction of 1.8% in comparison with 2017. The 11 million kWh saved are enough to supply electricity to more than 5,800 inhabitants a year.

### ➤ **Audio and Videoconferencing Rooms**

Aiming at optimizing the volume of air and ground travel by employees for work, BB has 662 audio and videoconferencing rooms in operation compared to 437 the previous year, which means an increase of 51% in the amount of equipment, distributed at the facilities of all units in Brazil and abroad.

### ➤ **Selective Collection Program**

The Selective Collection Program contemplates the management of solid, non-hazardous recyclable waste (paper, plastic, metal and glass) generated at BB's facilities, which are sent for recycling in accordance with public policies and current environmental legislation. In 2018, the program reached the mark of 1,848 facilities with the process implemented.

### ➤ **Environmental Certifications - ISO 14.001 and LEED**

The Banco do Brasil Building (Green Towers) in Brasília, the

new headquarters of BB's strategic units, already has LEED (Leadership in Energy and Environmental Design) - Sustainable Construction certification and is in the process of obtaining ISO 14001 certification, once again demonstrating the internal importance of the issue.

To ensure the premise of continuous improvement of the EMS, the Bank implemented an internal audit process and trained its own certified environmental auditors. This multidisciplinary team periodically checks management processes and results.

The actions defined in the Agenda 30 BB include the ISO 14.001 certification for two more buildings, namely, Ed. Sede BB São Paulo Av. Paulista – Capital Markets Directorate by the end of 2019 and Ed. Tancredo Neves CCBB – DF by 2020.

### ➤ **Operating Efficiency Index**

The Operational Efficiency Index (IEO) aims to disseminate the culture and practice of eco-efficiency among BB's employees, by reducing the consumption of natural resources and the management of solid, recyclable, non-hazardous waste discarded by the facilities.

Environmental performance is monitored by means of indicators of consumption of electricity, water and paper, and the registration of disposal of nonhazardous recyclable solid waste (paper, plastic, metal and glass), non-recyclable (waste) and organic waste disposed of by BB's facilities.

### ➤ **Carbon Management**

BB's GHG Emissions Inventory is the main tool for carbon management at the Bank. The inventory is built under the Operational Control approach, considering more than 5,000 facilities throughout the country (retail, wholesale and government agencies, regional units and strategic units)

The calculation of the Bank's GHG emissions follows the specifications of the Brazilian GHG Protocol Program and accounts for the gases emitted by its direct activities under Scope 1 (stationary combustion, mobile combustion and fugitive emissions), Scope 2 (electric power consumption) and the activities that influence Scope 3 (transportation and distribution, transportation and distribution, business travel, displacement of employees, solid and liquid waste from the operation).

The Inventory goes through external verification, according to ISO 14.064 definitions, part of which attests that the information contained in the GHG inventory is complete, accurate, consistent, transparent and without discrepancies. BB's GHG inventory has been gold certified since 2010.

BB's GHG emissions data are published annually in the Public Emissions Registry ([www.registropublicodeemissoes.com.br](http://www.registropublicodeemissoes.com.br)). The information is also made available to the market via CDP and Annual Report ([www.bb.com.br/ri](http://www.bb.com.br/ri)), in addition to being part of the national social and environmental indicator reports, such as the BMF&Bovespa's Corporate Sustainability Index (ISE), and international reports, such as the Dow Jones Sustainability Index (DJSI) of the New York Stock Exchange.

In 2019, BB committed to offsetting GHG emissions from scopes 1 and 2 by acquiring carbon credits in the voluntary, regulated or carbon market.

### ➤ **Shared transport of Febraban mailbags/cash**

Together with other banks and transportation suppliers, Banco do Brasil participates in the structure for transportation of mailbags and cash coordinated by Febraban. BB's participation currently represents 34%.

## Reduction Goals



### Energy Conservation Program

2% reduction in relation to 2018 consumption



### Rational Water Use Program

1% reduction in relation to 2018 consumption



### BB Zero Paper Program

50% reduction in paper consumption by 2020, in relation to 2017

25

### Migration to the Free Energy Market

BB units that will migrate to Free Market by 2020

100

### Selective Collection Program

BB units that will be included in the Program in 2019

## Transparency in our actions

### ➤ B3 ICO<sub>2</sub> Index

On June 17, 2010, BB joined the ICO<sub>2</sub> of the B3, the São Paulo Stock Exchange. The ICO<sub>2</sub> is composed of shares of the companies participating in the IBrX-50 index and considers not only the free float of the companies' shares, but also the level of efficiency of greenhouse effect gas emissions, identified by means of an analysis of the emission inventories.

As such, BB has been demonstrating its commitment to transparency to the market, as well as its willingness to seek alignment with the best practices related to corporate eco-efficiency and its contribution to a low-carbon economy, consistent with the provisions of its strategy and its Socio-environmental Responsibility Policy.

## Our commitment to the future

At Banco do Brasil, we seek to face the challenges of reconciling business competitiveness with the construction of a more sustainable and socially just world in a constructive and transparent manner. For this reason, the issue of Climate Change is of great relevance to our company.

In order to move forward in this direction and be attentive to the international scenario and the needs of our country, as well as to the directions of the financial sector, we are working with our Agenda 30 BB to connect our business strategies with global priorities. We seek innovative solutions to challenges, maintaining a sustainable operating model that combines financial performance with socio-environmental responsibility, in line with our history.

As such, we seek to act in a proactive and innovative way in the creation and improvement of financial solutions that stimulate and help governments, companies and individuals to implement actions to reduce greenhouse gas

emissions and adapt to the current and expected effects of climate change, collaborating in the transition to a low carbon economy.

Therefore, we have made efforts to increase the financing and/or investments for:

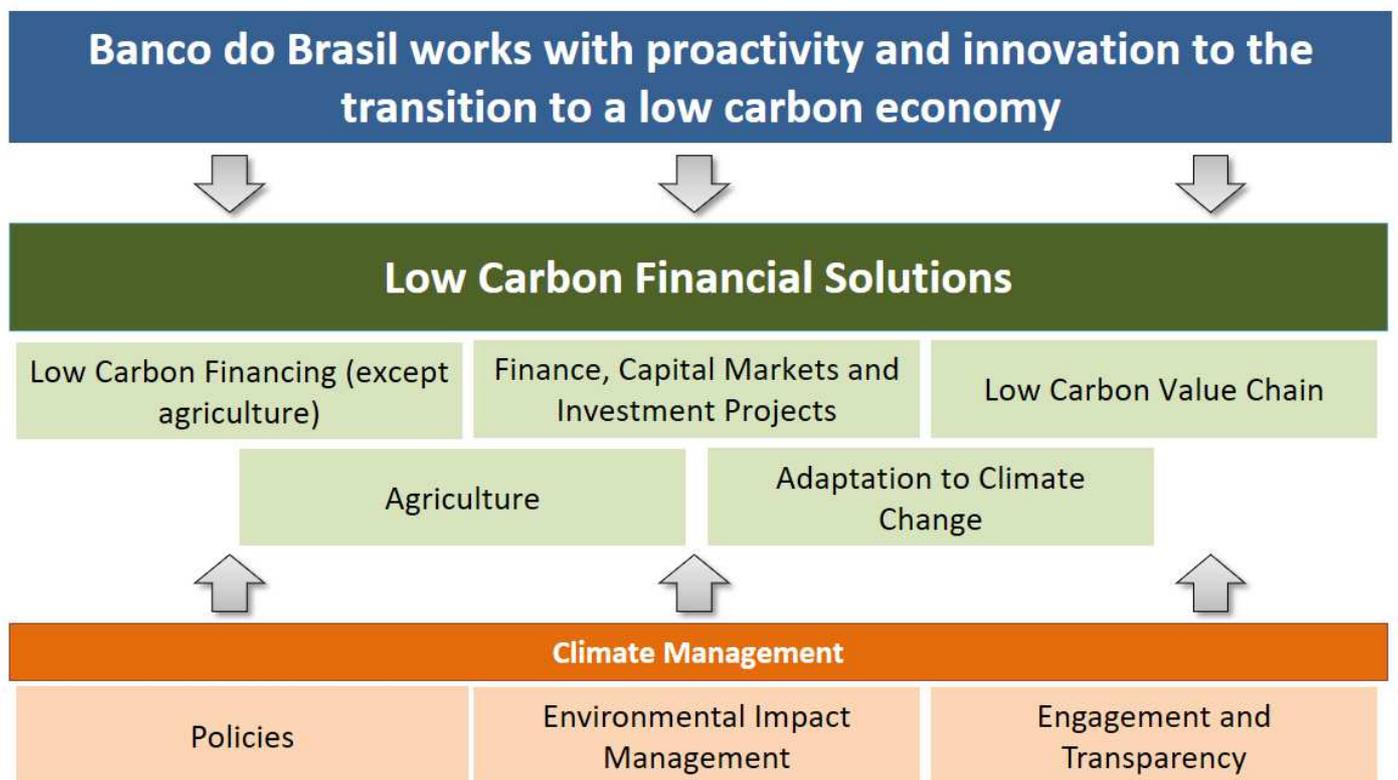
- projects for generation, distribution and consumption of renewable energy, including decentralized microgeneration;
- energy efficiency projects for industries, aiming at replacing them with more efficient machines and equipment and for commercial and residential real estate ventures;
- low-carbon agriculture projects and for the adoption of sustainable agricultural practices;
- sustainable timber and non-timber forest management projects and the reforestation of native and commercial forests;
- urban mobility, energy efficiency and mitigation and adaptation of cities and their citizens to the effects of climate change;
- access by investors and companies to capital directed to the low carbon economy via capital market instruments;
- economic and financial projects and instruments that support the implementation of the National Climate Change Policy and the National Emissions Reduction Policy ;
- engagement with governments, academia, business and the third sector to jointly promote actions that contribute to the transition to a low-carbon economy .

As such, we hope to continue to generate long-term value for both shareholders and society and, little by little, to build a fairer and more humane world for the generations to come.

This commitment is based on a practical Action Plan for the next 5 years and aligned with the company's strategy, Banco do Brasil's Socio-Environmental Responsibility Policy - PRSA and the Sustainability Plan - Agenda 30 BB.

The main focus of the Action Plan is on BB's core business and climate finance <sup>5</sup>, that is, the availability of low-carbon financial solutions, which are organized into pillars of action and specific activities.

The performance of the main focus is supported by the focus on climate management, which provide organizational and structuring support, from internal and external actions, organized into pillars and related activities, as follows :



5. The Standing Committee on Finance of the United Nations Framework Convention on Climate Change (UNFCCC) defines climate finance as: "Financing that aims to reduce emissions and improve greenhouse gas sinks and aims to reduce vulnerability, maintain and increase the resilience of human and ecological systems to the negative impacts of climate change".